Scenario Table

Scenario ID	126
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Goal	Diagnose quench problem during hardware commissioning (or during operation)
Level	High Level
Actors	CERN operators at field control room. Magnet expert working at Fermilab at the remote operations center
Trigger	During the upramp of the inner triplet magnets, a quench is detected in all of the Q1, Q2, Q3 elements. At the same time, some of the orbit correctors have also quenched.
Narrative	21:00 CERN standard time (14:00 Fermilab time) 1) The cause of the quench is unknown. US resident Hardware commissioning (HC) expert at CERN has gone home for the evening. The CERN operators in the field control room are going through the list of CERN "on call" personnel for help in trouble shooting the problem. They also elicit the help of the Fermilab remote operations center since there is a US magnet expert is “On shift” at the remote operation center to cover for the US resident in the evening. Using his cell phone, CERN operator calls the Fermilab Remote control center (assuming there is no video link)

	2) The Fermilab remote control magnet expert on shift also sees the quench entry in the Hardware Commissioning log book and has called up the voltage traces from the CERN magnet data loggers. By looking at the resistive voltage growth which is accessible for the data set of the event, the remote control person sees that the quench velocity is very slow. He/she refers to the Fermilab magnet test facility log books to locate similar tests during the production test program. He/she then refers to the Fermilab magnet test data base to look at typical quench profiles. 3) In consultation with the CERN operators, they conclude that there has been a bus quench which has affected all the bus work. Looking at the CERN online monitoring, they see that the liquid level monitoring in the distribution box, is set to 100% i.e. full of liquid. It has not moved from 100% for the last 3 hours. This is an unlikely since the liquid levels are set to a range and are part of a P&ID loop to supply liquid. They also notice that the thermometers in the liquid volume are reading 20 K, indicative of helium gas. 4) The remote control person advises the CERN operator to check the liquid level controller. The CERN operator contacts the cryogenic instrumentation commissioning team, who then determine that the current source to the liquid level gauge had been disconnected at the liquid level electronics, giving a false positive reading. The liquid level had fallen to a point where the buses were not in liquid, which caused them to quench. The problem is corrected and the magnet system is ramped up to full field. 5) The remote magnet expert scans through the off line data, looking throughout the interaction region magnets for similar problems but does not find any. He/she then makes an entry into the Hardware commissioning log book of the occurrence.
Exceptions	None
Comments	The installation of the US deliverables will begin in the Fall of 2005 with hardware commissioning starting in the ~December 2005. During the commissioning, the control rooms will be located in the tunnel. These field control rooms will have control of the magnets powering and quench protection and local cryogenics and vacuum, and will have monitoring capability of the system cryogenic, vacuum and any operational beam line

	instrumentation. We are still in discussions with the CERN hardware commissioning working group about the accessibility of hardware commissioning data to remote hardware commissioning experts. It is agreed by all parties that there must be strict requirements on the accessibility and confidentiality of data generated during hardware commissioning as well as operation. This scenario could also be applied to beam operation when the displays will be fully operation + there will be an operational interplay between the beam and the magnet performance. These field stations will not always be staffed with US personnel as there will be only be one or two resident HC personnel at any given time. One can imagine US HC personnel monitoring the HC remotely, particularly in times when are lone US person is off shift and there is a critical HC event in process. Also, the local US HC will not be an expert on all US hardware, and will call upon the resources in the US as necessary.